

Math 3A HW #8

Answers must be submitted via Moodle before 9:30AM on Friday, Nov. 3rd 2017.

Good luck!

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Solve the problem.

- 1) A surveyor is standing 35 ft from the base of a building. She measures the angle of elevation to the top of the building to be 65° . How accurately must the angle be measured for the percentage error in estimating the height of the building to be less than 5%? 1) _____
A) To within -0.005° B) To within -0.02%
C) To within -0.47° D) To within -0.02°
- 2) About how accurately must the interior diameter of a 8-m high cylindrical storage tank be measured to calculate the tank's volume within 0.5% of its true value? 2) _____
A) To within 0.25 meters B) To within 0.25%
C) To within 0.5% D) To within 0.5 meters
- 3) A manufacturer contracts to mint coins for the federal government. How much variation in the radius of the coins can be tolerated if the coins are to weigh within 1/10 of their ideal weight? Assume that the thickness does not vary. 3) _____
A) Variation of 10.0000% or less B) Variation of 5.0000% or less
C) Variation of 0.0500% or less D) Variation of 5.0000 cm or less
- 4) The radius of a ball is claimed to be 4.5 inches, with a possible error of 0.05 inch. Use differentials to approximate the maximum possible error in calculating the volume of the sphere and the surface area of the sphere. 4) _____
A) $4.05\pi \text{ in.}^3$; $1.8\pi \text{ in.}^2$ B) $0.9\pi \text{ in.}^3$; $18\pi \text{ in.}^2$
C) $1.8\pi \text{ in.}^3$; $4.05\pi \text{ in.}^2$ D) $8.1\pi \text{ in.}^3$; $3.6\pi \text{ in.}^2$
- 5) A cube 7 inches on an edge is given a protective coating 0.1 inches thick. About how much coating should a production manager order for 1000 cubes? 5) _____
A) About 14,700 in.^2 B) About 34,300 in.^3
C) About 4900 in.^2 D) About 29,400 in.^3
- 6) The concentration of a certain drug in the bloodstream x hr after being administered is approximately $C(x) = \frac{4x}{14 + x^2}$. Use the differential to approximate the change in concentration as x changes from 1 to 1.11. 6) _____
A) 0.29 B) 0.16 C) 0.25 D) 0.03
- 7) $A = \pi r^2$, where r is the radius, in centimeters. By approximately how much does the area of a circle decrease when the radius is decreased from 2.0 cm to 1.8 cm? (Use 3.14 for π .) 7) _____
A) 2.3 cm^2 B) 2.5 cm^2 C) 1.3 cm^2 D) 2.7 cm^2

- 8) $V = \frac{4}{3}\pi r^3$, where r is the radius, in centimeters. By approximately how much does the volume of a sphere increase when the radius is increased from 3.0 cm to 3.2 cm? (Use 3.14 for π .) 8) _____
- A) 22.8 cm³ B) 22.6 cm³ C) 1.5 cm³ D) 22.4 cm³
- 9) The diameter of a tree was 11 in. During the following year, the circumference increased 2 in. About how much did the tree's diameter increase? (Leave your answer in terms of π .) 9) _____
- A) $\frac{13}{\pi}$ in. B) $\frac{11}{\pi}$ in. C) $\frac{\pi}{2}$ in. D) $\frac{2}{\pi}$ in.
- 10) Estimate the volume of material in a cylindrical shell with height 28 in., radius 7 in., and shell thickness 0.6 in. (Use 3.14 for π .) 10) _____
- A) 738.5 in.³ B) 748.5 in.³ C) 369.3 in.³ D) 1230.9 in.³
- 11) About how accurately must the interior diameter of a cylindrical storage tank that is 14 m high be measured in order to calculate the tank's volume within 0.5% of its true value? 11) _____
- A) Within 0.5% B) Within 0.5 meters
C) Within 0.25% D) Within 0.25 meters
- 12) A manufacturer contracts to mint coins for the federal government. How much variation dr in the radius of the coins can be tolerated if the coins are to weigh within 1/10 of their ideal weight? Assume that the thickness does not vary. 12) _____
- A) 0.050% B) 0.10% C) 5.0% D) 10%
- 13) The radius of a ball is claimed to be 4.5 inches, with a possible error of 0.05 inch. Use differentials to approximate the maximum possible error in calculating the volume of the sphere and the surface area of the sphere. 13) _____
- A) 4.05π in.³; 1.8π in.² B) 1.8π in.³; 4.05π in.²
C) 0.9π in.³; 18π in.² D) 8.1π in.³; 3.6π in.²

Find the linearization $L(x)$ of $f(x)$ at $x = a$.

- 14) $f(x) = \sqrt{2x + 81}$, $a = 0$ 14) _____
- A) $L(x) = \frac{2}{9}x - 9$ B) $L(x) = \frac{1}{9}x + 9$ C) $L(x) = \frac{1}{9}x - 9$ D) $L(x) = \frac{2}{9}x + 9$
- 15) $f(x) = \tan x$, $a = \pi$ 15) _____
- A) $L(x) = x - 3\pi$ B) $L(x) = 3x - \pi$ C) $L(x) = x - \pi$ D) $L(x) = x + \pi$

Find the quadratic approximation of f at $x = 0$.

- 16) $f(x) = \tan^{-1} 5x$ 16) _____
- A) $p_2(x) = 1 + \frac{5}{2}x^2$ B) $p_2(x) = 1 + 5x^2$
C) $p_2(x) = 5x$ D) $p_2(x) = 1 - 5x^2$

- 17) $f(x) = \tan 7x$ 17) _____
- A) $p_2(x) = 7x$ B) $p_2(x) = 1 + \frac{7}{2}x^2$
- C) $p_2(x) = 1 + 7x^2$ D) $p_2(x) = 1 - \frac{7}{2}x^2$
-
- 18) $f(x) = \sqrt{64 - x^2}$ 18) _____
- A) $p_2(x) = 8 - \frac{x^2}{16}$ B) $p_2(x) = 8 + \frac{x^2}{8}$
- C) $p_2(x) = 8 + \frac{x^2}{16}$ D) $p_2(x) = 8 - \frac{x^2}{8}$
-
- 19) $f(x) = \ln(\cos 6x)$ 19) _____
- A) $p_2(x) = 18x^2$ B) $p_2(x) = 1 + 18x^2$
- C) $p_2(x) = -18x^2$ D) $p_2(x) = 1 - 18x^2$
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- 20) $f(x) = \ln(1 + \sin 7x)$ 20) _____
- A) $p_2(x) = 1 + 7x + \frac{49}{2}x^2$ B) $p_2(x) = 1 - 7x + \frac{49}{2}x^2$
- C) $p_2(x) = 7x - \frac{49}{2}x^2$ D) $p_2(x) = 7x + \frac{49}{2}x^2$
-
- 21) $f(x) = e^{\sin 6x}$ 21) _____
- A) $p_2(x) = 1 - 6x + 18x^2$ B) $p_2(x) = 6x - 18x^2$
- C) $p_2(x) = 6x + 18x^2$ D) $p_2(x) = 1 + 6x + 18x^2$
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- 22) $f(x) = e^{\ln 2x}$ 22) _____
- A) $p_2(x) = 2x + 2x^2$ B) $p_2(x) = 1 + 2x + 2x^2$
- C) $p_2(x) = 2x$ D) $p_2(x) = 2x - 2x^2$
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- 23) $f(x) = x\sqrt{16 - x^2}$ 23) _____
- A) $p_2(x) = 1 - 4x$ B) $p_2(x) = 16x^2$ C) $p_2(x) = 1 + 4x$ D) $p_2(x) = 4x$