

Instructions: The exam. consists of 12 problems. There is space to work beside each problem. Most of the problems offer multiple-choice answers. You should use the answers to check yourself. It is important to show your work, and make your steps clear and readable. Partial credit may be given for solutions that are set up correctly, even though the final answer is incorrect, and full credit may not be given for a correct answer that is not supported by correct work.

Please remember your obligations under the honor code.

The spaces below are not for answers—but for recording scores.

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1. An appropriate trigonometric substitution converts the integral

(a) $\int_{\pi/4}^{\pi/3} 4 \tan^2 \theta \sec \theta d\theta$.5in (b) $\int_{\pi/6}^{\pi/4} 2 \tan^2 \theta \sec \theta d\theta$

(c) $\int_2^{2\sqrt{3}} 4 \tan^3 \theta d\theta$.2in (d) $\int_{\pi/4}^{\pi/2} 4 \sec^3 \theta d\theta$.2in (e) $\int_{\pi/4}^{\pi/3} \tan^3 \theta d\theta$ 3in

2. What is $\int_0^1 1\sqrt{4-x^2}dx$?

(a) 0 .2in (b) 12 .2in (c) 14 .2in (d) $\pi/2$.2in (e) $\pi/6$

3. Which of the following integrals represents the length of the curve $y = x^3$, for $0 \leq x \leq 1$?

(a) $\int_0^1 (1 + 9x^4)dx$.2in (b) $\int_0^1 (1 + 3x^2)dx$.2in (c) $\int_0^1 \sqrt{1+x^3}dx$

(d) $\int_0^1 \sqrt{1+9x^4}dx$.8in (e) $\int_0^1 \sqrt{1+x^6}dx$ 3in

4. For the region bounded by $y = x^2$, $y = 0$, $x = 0$, $x = 2$, what is the centroid?

(a) (12, 1).2in (b) (32, 65).2in (c) (1, 2).2in (d) (56, 32).2in (e) (35, 1)

5. For the region bounded by $y = \sin x$ and $y = -\sin x$, for $0 \leq x \leq \pi$, what is the centroid? [You may avoid some tedious calculation by appealing to symmetry.]

(a) (0, π).2in (b) (0, $\pi/2$).2in (c) ($\pi/2$, 0).2in (d) (π , 0).2in (e) ($\pi/2$, 2π) 3in

6. For $f(x) = 1/(2+x)$, what is the 4th Taylor polynomial $P_4(x)$?

(a) $12 - x^4 + x^2/8 - x^3/16 + x^4/32$.2in (b) $1 + x^2 + x^2/4 + x^3/8 + x^4/16$

(c) $12 + x^4 + x^2/6 + x^3/12 + x^4/48$.2in (d) $1 - x^2 + x^2/4 - x^3/8 + x^4/16$

- (e) the function has no 4th Taylor polynomial
7. If $f(x) = 3x^{17} - 2x^{16} + \dots + 4x^5 + \dots + x + 5$, what is $f^{(5)}(0)$?
 (a) 475.2in (b) 480.2in (c) 485.2in (d) 490.2in (e) 495 3in
8. How many different words can be made out of 3 S 's and 5 F 's?
 (a) 52.2in (b) 54.2in (c) 56.2in (d) 58.2in (e) 60
9. A box contains 12 flashbulbs, of which 4 are defective. If you choose 4 of the 12, at random, what is the probability that all will be good?
 (a) 1099.2in (b) 1299.2in (c) 1499.2in (d) 1699.2in (e) 211 3in
10. What is the sum of the infinite series $\sum_{k=0}^{\infty} (-13)^k$?
 (a) 13.2in (b) 38.2in (c) 23.2in (d) 34.2in (e) 1
11. What is $1 + 12 + 12^2 + \dots + 12^8$?
 (a) $2 - 12^8$.4in (b) 2.4in (c) $2 + 12^9$.4in (d) 1
 (e) there is no sum, since $|2| \geq 1$ 3in
12. A patient begins on Monday taking 1 unit of a drug every day. For each unit given, the amount remaining in the patient's system t days later is $(.2)^t$. How many units of the drug are in the patient's system just after Wednesday's dose?
 (a) 1.2in (b) 1.2.2in (c) 1.22.2in (d) 1.24.2in (e) 1.4