

MATH 253/Sample Midterm. March 2007

Part I: Multiple Choice

Closed Book. No Calculators.

Name/Student Number:...../.....

1. $\tan(\sin^{-1}(4/5)) =$

- a) 5/4.
- b) 4/3.
- c) 1/3.
- d) 4/5.
- e) 3/4.

2. $\tanh(\ln(4)) =$

- a) 17/15.
- b) 15/17.
- c) -15/17.
- d) 3/5.
- e) -17/15.

3. If $a > 0$ and f is continuous functions on (a, ∞) and $f(x) \geq 1/x^2$, then $\int_a^\infty f(x)dx$

- a) converges.
- b) diverges.
- c) may or may not converge.
- d) is a negative constant.
- e) is a positive constant.

4. If we let $x = 2 \tan \theta$, then $\int \frac{1}{(x^2 + 4)^2} dx$ becomes:

a) $\frac{1}{8} \int \sec^2 \theta d\theta$.

b) $\frac{1}{8} \int \sin^2 \theta d\theta$.

c) $\frac{1}{8} \int \cos^2 \theta d\theta$.

d) $\frac{1}{16} \int d\theta$.

e) $\frac{1}{8} \int d\theta$.

5. If $\ln(2x) + \ln(x - 2) = \ln(6)$, then $x =$

a) 3.

b) No real solution exists.

c) $\frac{1}{3}$.

d) $\frac{1}{2}$.

e) -3.

6. If $P(x)$ is a polynomial of degree 3 and $Q(x) = (x^2 + 1)^3$ then the partial fraction decomposition of $\frac{P(x)}{Q(x)}$ is

a) $\frac{Ax + B}{(x^2 + 1)^3} + \frac{Cx + D}{(x^2 + 1)^2} + \frac{Ex + F}{(x^2 + 1)}$.

b) $K + \frac{Ax + B}{(x^2 + 1)^3} + \frac{Cx + D}{(x^2 + 1)^2} + \frac{Ex + F}{(x^2 + 1)}$.

c) $\frac{A}{(x^2 + 1)^3} + \frac{B}{(x^2 + 1)^2} + \frac{C}{(x^2 + 1)}$.

d) $K + \frac{A}{(x^2 + 1)^3} + \frac{B}{(x^2 + 1)^2} + \frac{C}{(x^2 + 1)}$.

e) $Kx + L + \frac{Ax + B}{(x^2 + 1)^3} + \frac{Cx + D}{(x^2 + 1)^2} + \frac{Ex + F}{(x^2 + 1)}$.

7. f is an invertible function and g is its inverse function (i.e. $f^{-1} = g$). If $f(4) = 6$, and $f'(4) = -3$, then $g'(x)$ at $x = 6$ is

- a) 3.
- b) -3 .
- c) 1.
- d) $1/3$.
- e) $-1/3$.

8. If $y = x^x$, at $x = 1$, $\frac{dy}{dx} =$

- a) 0.
- b) 2.
- c) $e \ln(2) - 1$.
- d) e .
- e) 1.

9. $\tan^{-1}(\tan(13\pi/9)) =$

- a) $-\pi/18$.
- b) $2\pi/9$.
- c) $-4\pi/9$.
- d) $4\pi/9$.
- e) $\pi/9$.

10. Which of the following integrals give the area of the region enclosed by $y = x^3 + 1$ and $y = 2x^2 + 1$.

a) $A = \int_0^2 (2x^2 + x^3 + 2)dx.$

b) $A = \int_{-2}^0 (2x^2 - x^3)dx.$

c) $A = \int_{-2}^0 (x^3 - 2x^2)dx.$

d) $A = \int_0^2 (2x^2 - x^3)dx.$

e) $A = \int_0^2 (x^3 - 2x^2)dx.$